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March 17, 1956

VOL. 69, NO. 11 PAGES 161-176

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Top Talent Winners

See Page 164

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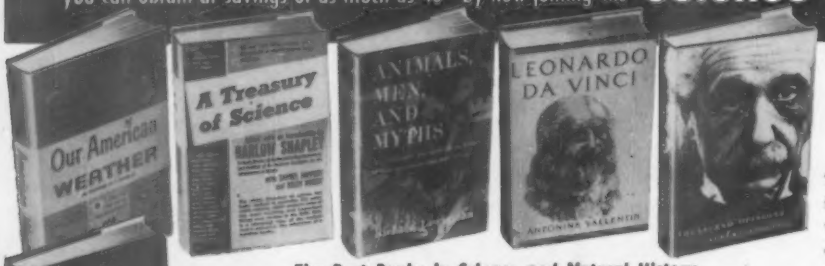

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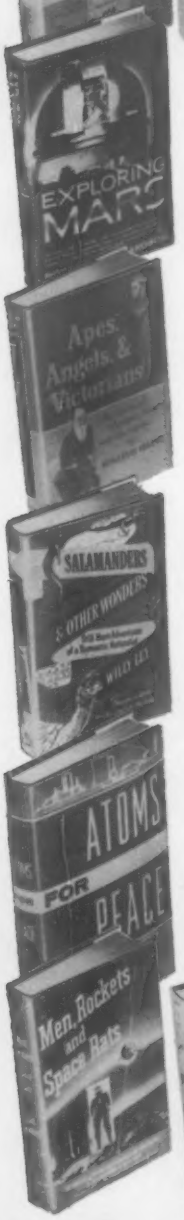

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PHYSICS

Einstein's Last Revision

Simplified version of Einstein's generalized theory of gravitation, sent to publisher before the scientist's death, now available. Only time will reveal its influence.

➤ THE LATE Albert Einstein, in the last months before his death in April, 1955, completed a revised version of his generalized theory of gravitation.

This simplified version is published as an appendix to the fifth and final edition of his book, "The Meaning of Relativity." (See p. 172.)

Prof. Einstein said his simplification is "the logically simplest relativistic field theory which is at all possible." He called it the "Relativistic Theory of the Non-Symmetric Field."

Its aim is a complete description of the physical universe—gravitational and electromagnetic forces—by a single theory.

Einstein believed his theory holds the key to the universe, unifying in one concept the tiny world of the atom and the vast reaches of star-filled space.

The final revision reaffirms Einstein's belief that God does not play dice with the cosmos. It runs directly against the main current of modern physical thought, since it is a "field" theory rather than a "particle" theory such as is favored by most other physicists.

Einstein pointed out in his conclusion that "almost everybody" will disagree with his belief that a field theory will allow understanding of the "atomistic and quantum structure" of reality.

"Nobody knows anything reliable about it," Einstein stated, and only by "significant progress" in mathematical methods will an understanding be reached.

These mathematical difficulties have so far prevented checking any version of Einstein's generalized field theory against known experimental facts.

Development of a single theory to explain both gravitational and electromagnetic forces has been a major goal of physicists since 1920. At the time of his death Einstein believed the two forces are simply different manifestations of a unified cosmic field.

The new 166-page book contains 132 pages substantially the same as the first edition, published in 1922, consisting of the text of Einstein's Stafford Little lectures, delivered in May, 1921, at Princeton University. For the second edition, published in 1945, Einstein added an appendix discussing certain advances in the theory of relativity since 1921.

For the third edition in 1950, Einstein added appendix II on his Generalized Theory of Gravitation. The fourth edition appeared in 1953, with a revised appendix. In 1954 he changed the basis for choosing a particular set of equations based on their "strength," having made an error in counting the number of applicable equations in the fourth edition.

In the fifth edition, published posthumously, the 34 pages of appendix II were completely revised.

In 1905 Einstein published his famous special theory of relativity, which set forth the equivalence of mass and energy and led to the well-known equation, $E=mc^2$, or energy equals mass times the square of the velocity of light.

The world will have to wait to see if Einstein's final revision, the "Relativistic Theory of the Non-Symmetric Field," will influence the present half century as profoundly as his theory of relativity did the first half.

Science News Letter, March 17, 1956

PHYSICS

Tiny Solid Capacitor Will Cut Missile Weight

➤ AN ALL-SOLID, completely dry electrolytic capacitor made of the rare metal, tantalum, has been produced by Sprague Electric Company, North Adams, Mass.

The tiny metal cylinder, the first of its kind to be made available commercially, represents a wide departure in the field of electrolytic units. Its development means the reduction in both volume and weight of devices using electronic circuits.

The tantalum capacitor is a quarter of an inch long and slightly less than an eighth of an inch in diameter. Twenty of them can be placed on a penny. The performance rating of the new electronic device is equal to that of 1,000 Leyden jars, the grandfather of all condensors or capacitors.

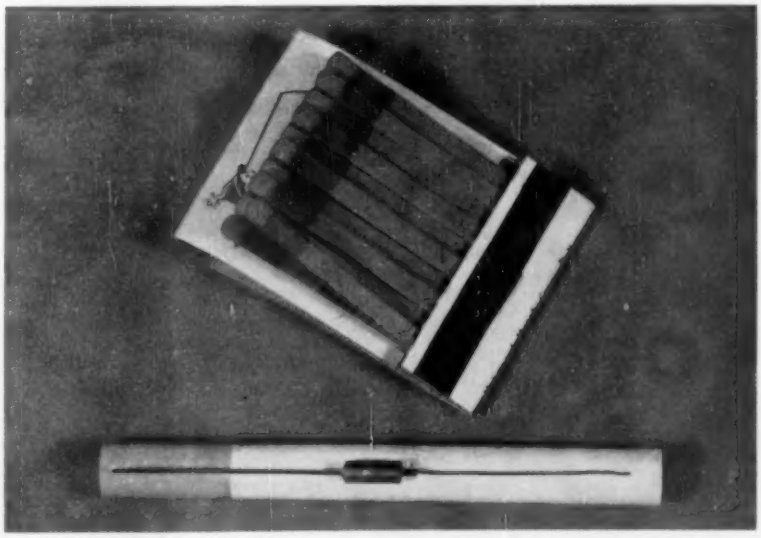
It will be of particular importance for use in guided missiles and earth satellites, Sprague scientists believe. An intercontinental ballistic missile will require as many as 1,000 capacitors. The new device, cuts the weight of each capacitor one-twentieth of the aluminum capacitors now used commercially.

Because it is made of a solid metal, it cannot boil, freeze or leak, as do those now made with either liquids or pastes. In tests conducted at Sprague, the capacitor was found to work efficiently in a temperature range of from minus 85 degrees Centigrade to more than 100 degrees Centigrade.

The tantalum capacitor, which stores an electrical charge, is being shown publicly for the first time at the meeting of the Institute of Radio Engineers in New York on March 19.

The electrical ratings in which the capacitors may be made, together with tiny transistors, resistors and batteries, may make possible miniature circuits to be fit into a container the size of a package of cigarettes.

Science News Letter, March 17, 1956



SOLID CAPACITOR—This tiny solid tantalum capacitor, barely visible atop a cigarette, is a development of Sprague Electric Company, North Adams, Mass. The completely dry electrolytic condenser is slated for an important role in cutting the weight and volume of electronic circuits.

GENERAL SCIENCE

Pick Top STS Winners

Robert T. Moore of Silver Spring, Md., received $2,800 grand award of the Science Talent Search. John B. Clark of Sycamore, Ill., won the $2,000 scholarship.

See Front Cover

➤ A 17-YEAR-OLD MATHEMATICIAN from Silver Spring, Md., whose work helps to solve problems from crystallography to floor tiling, won first prize in the Fifteenth Annual Science Talent Search in Washington.

Robert T. Moore, a Montgomery Blair High School senior, was awarded the $2,800 Westinghouse Grand Science Scholarship. He is shown on the right in the photograph on the cover of this week's SCIENCE NEWS LETTER.

Second-place winner was an 18-year-old inventor of a plastic to preserve biological specimens for display and study. He is John B. Clark of Sycamore High School, Sycamore, Ill., who was awarded the $2,000 Westinghouse Science Scholarship. He is shown on the left in the photograph on the cover of this week's SCIENCE NEWS LETTER.

Ranking highest among eight $400 scholarship winners was John H. Venable Jr. from Northside High School, Atlanta, Ga., who demonstrated the use of polarized light to investigate the flow of liquids.

The winners of the Science Talent Search, which is administered by SCIENCE SERVICE through Science Clubs of America, were announced at an awards banquet, following an address by Dr. Caryl P. Haskins, president, Carnegie Institution of Washington. (See SNL, March 10, p. 154:) The banquet culminated a five-day competition among 40 young high school seniors from 21 states and the District of Columbia. (For related stories, see p. 166.)

The 40 teen-agers, picked from 3,375 entries totaling 20,828 throughout the nation, were brought to Washington to take part in the Science Talent Institute and to compete for the scholarships, provided by the Westinghouse Educational Foundation.

Robert Moore described his project as "roughly analogous to a determination of the possible shapes that the pieces of a jigsaw puzzle may have if they must be alike, straight-sided and convex.

"In its three-dimensional counterpart, this study is possibly relevant to crystallography and organic chemistry (high polymers). More mundane problems, such as those concerning mosaics and floor tiles, might also find solutions in my investigations," he said. "Intuition and curiosity seem to be as essential to a scientist as they are to an artist or composer."

Mr. Moore has built and tested a Wilson cloud chamber, constructed his own clock radio and devised a, machine to project images of protozoa for science club meetings. He rid his basement of skunks by inventing a no-return door. Among his current projects is building a Newtonian telescope. He is secretary of the Junior Academy of Sciences in Washington, D. C.

John Clark, second-place winner, synthesized an improved polyester embedding resin, a plastic to preserve biological specimens that he believes is better in many ways than those now on the market.

Mr. Clark is president of his senior class, a musician and has earned three awards for expertness in diving, and four letters in football.

John Venable, alternate to the $2,000 Grand Scholarship, used polarized light to investigate the flow of liquids. The data his project has yielded him may, he believes, have important uses in design and testing of fluid systems and marine equipment, and as a supplement to wind tunnel experimentation.

Science News Letter, March 17, 1956

Aluminum is the most plentiful non-ferrous metal in the world.

As many as 1,000 tests may be made on a single *dye* before it reaches the market.

Use of mechanical *cotton pickers* in Mississippi Delta cotton during 1954-55 reduced harvest-labor requirements below those of hand-picking by 95% and resulted in increased returns to growers of nearly $13 an acre.

***PROJECTS EXHIBITED**—Some of the projects of the 40 top competitors for Westinghouse Science Talent Search Scholarships, as demonstrated to the public by the high school seniors, are shown in the photographs on the opposite page.*

Left column, beginning at the top, are: James Bardeen, with his demonstration of how electrons are trapped in rocks; John Venable Jr., alternate to the $2,000 scholarship, explaining how he analyzed photoelastic stress in liquids; Leland Edmunds Jr., showing the chemical nature of a firefly's bioluminescence, and Melvin Zwillenberg, demonstrating an experimental bubble chamber for the study of charged atomic particles.

Center column are: Ronald Egnitz and his model of the space satellite to be launched by the United States; Daniel Ch'en, explaining the uses of a radio frequency induction furnace, and James Nearing demonstrating the geometry of soap bubbles.

Right hand column are: Carol Ann Joyce, with her exhibit of atoms in action; Susan Zimet, demonstrating how mice can be immunized to a tumor; Robert Gorn, explaining how his robot electronic turtle operates, and Hersha Sue Fisher, with her model of the Salt River Valley, Arizona. →

SCIENCE NEWS LETTER

VOL. 69 MARCH 17, 1956 NO. 11

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., NOrth 7-2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40, P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283) authorized February 28, 1950. Established in mimeographed form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 1 E. 54th St., New York 22, ELdorado 5-5666, and 435 N. Michigan Ave., Chicago 11, SUperior 7-6048.

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TRAPPED ELECTRONS
ATOMS IN
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OF THE
FIREFLY
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OF ITS
CONTINUOUS CLOUD CHAMBER
USING HOT AND COLD RUNNING WATER TO SUPPLY THE TEMPERATURE GRADIENT

GENERAL SCIENCE

Winners of Scholarships

GRAND SCHOLARSHIP OF $2,800

Moore, Robert Thorpe, Silver Spring, Md.

$2,000 SCHOLARSHIP AND ALTERNATE FOR $2,800

Clark, John Bell, Sycamore, Ill.

ALTERNATE TO THE $2,000

Venable, John Heinz, Jr., Atlanta, Ga.

SCHOLARSHIPS OF $400

Bardeen, James Maxwell, Urbana, Ill.
Campbell, John Howland, Minneapolis, Minn.
Ch'en, Daniel, Eugene, Ore.
Ford, Edwin Foster, Arlington, Va.
Johnson, Dennis Lee, Exeter, N. H.
Joyce, Carol Ann, Appleton, Wis.
O'Brien, Thomas William, Rochester, Minn.
Venable, John Heinz, Jr., Atlanta, Ga.

ALTERNATES

1st alt. Anderson, Gary Bertel, Truckee, Calif.
2nd alt. Nading, Lewis Karl, Indianapolis, Ind.

SCHOLARSHIPS OF $100

Anderson, Gary Bertel, Truckee, Calif.
Brower, Edmond Dehm, Augusta, Maine
Carroll, Robert Lynn, Mason, Mich.
Diamondis, Peter John, South Bend, Ind.
Edmunds, Leland Nicholas, Jr., Newport News, Va.
Egnitz, Ronald Michael, Braddock, Pa.
Fisher, Hersha Sue, Phoenix, Ariz.
Goodman, John Mott, Seattle, Wash.
Gorn, Robert Aaron, Newtonville, Mass.
Gray, Charles Augustus, Washington, D. C.
Groder, Martin Gary, Forest Hills, N. Y.
Halpern, Martin Brent, Tucson, Ariz.
Hansen, Carolyn Marjorie, Kenmore, N. Y.
Hood, Leroy Edward, Shelby, Mont.
Hoxie, Dwight Thomas, Mound, Minn.
Kayser, Boris Jules, Lakewood, N. J.
Lichtenbaum, Stephen, Brooklyn, N. Y.
Matchett, Mary-Dell, Hinsdale, Ill.
Miller, John Charles, Lockport, N. Y.
Nading, Lewis Karl, Indianapolis, Ind.
Nearing, James Carr, Inglewood, Calif.
Och, Rosemary Patricia, Madison, N. J.
Riendl, Ida Louise, Marshfield, Wis.
Rony, Peter Roland, Los Angeles, Calif.
Runnels, Lynn Kelly, Tulsa, Okla.
Solovay, Robert Martin, Brooklyn, N. Y.
Thorson, Margaret Ann, Floyd, Iowa
Yost, James Whitney, Indianapolis, Ind.
Zimet, Susan Elizabeth, Brooklyn, N. Y.
Zwillenberg, Melvin Leslie, Brooklyn, N. Y.

Addresses are locations of the schools from which entries were made.

Science News Letter, March 17, 1956

PHYSICS

Test Hypervelocity Gun

➤ MISSILES the size of golf balls have been fired at speeds over 7,000 miles per hour from a new hypervelocity gun for the first time.

The research tool promises to save taxpayers tens of thousands of dollars each time a test missile is fired.

The new gun was shown by Dr. Hermann H. Kurzweg, chief of the Aeroballistic Research Department, U. S. Naval Ordnance Laboratory, to the 40 finalists. (For related story, see p. 164.)

"Never before have missiles of this size been fired and photographed at such speeds," Dr. Zaka I. Slawsky, chief of the hyperballistics division, told the group. "Since so little is known with certainty about the forces air exerts on objects traveling at these speeds, and, conversely, about the effects such objects have on air, any information we collect will increase materially the rate at which successful high speed missiles can be made."

The gun is the first ever developed that can launch models equipped with instruments to study the effects of super high speeds on airplanes, missiles and satellites.

The instrument, Dr. Slawsky said, will "enable us to launch models of planes and missiles at the enormous speeds needed for long-range flight and to attain the orbital speed necessary to reach satellite motion."

The gun, which is undergoing further tests, is designed so its chamber can be loaded with helium under pressure. The helium is heated by steam produced by combustion when hydrogen and oxygen are mixed with it.

To get a maximum pressure on the projectile with a minimum of waste energy, as little gas as is possible weight-wise must be used. Steam-heated helium has answered the need.

"With this new model-launching device, we expect to gain invaluable information for the cracking of the so-called heat barrier," Dr. Slawsky said. "Further studies of the heat barrier are necessary, of course, before a good interplanetary missile will be developed."

Dr. Slawsky said the gun will move the study of missile problems from the field into the laboratory.

"For the present, our new technique will enable us to study and determine the basic laws governing the behavior of objects moving at extreme high speed through air, for very little is known with certainty about the behavior of air around objects that are traveling at 6,000 or more miles an hour."

For the first time, too, Dr. Slawsky said, controlled studies can be made of the way heat is generated around a missile and the rate this heat is transferred to the missile.

"This should help us find facts needed to overcome the tremendous heating of high-speed missiles," Dr. Slawsky explained. "Perhaps it will help us learn how not only to get a missile up and out of the atmosphere, but to return it to earth, safely and in a pre-determined spot."

Science News Letter, March 17, 1956

SCIENCE TALENT INSTITUTE SCENES — *The 40 Science Talent Search winners are shown in the photographs on the opposite page in some of their many activities.*

Left column, beginning at the top, are: Rep. H. R. Gross (R.-Iowa) and Rep. Noah Mason (R.-Ill.) chatting with winners at the Congressional dinner; three top scholarship winners are congratulated by Watson Davis, director of SCIENCE SERVICE, *and Dr. Caryl P. Haskins, president of Carnegie Institution of Washington; seated in a row are four Science Talent Search alumni present this year, Dr. Josiah Macy Jr. '43, Dr. Beatrice M. Shriver '42, Dr. Marina Prajmovsky Meyers '42 and Dr. M. Don George '49, who are advising the 1956 winners; and Dr. Bayne-Jones, retired USAR Brig. Gen. who is technical director of research in the Army's Office of the Surgeon General, shows samples of food preserved by irradiation to several winners.*

Center column are: Mary-Dell Matchett and James Nearing photographed on the Capitol steps; Dr. Hermann H. Kurzweg, chief of the aeroballistics research department at the Naval Ordnance Laboratory, explaining to seven of the eight girls the details of testing missiles in wind tunnels; R. J. Walker, a physicist in the mineral products division at the National Bureau of Standards, demonstrates a model of zirconium dioxide to Susan Zimet, and Dr. Daniel Alpert, associate director of Westinghouse Research Laboratories in Pittsburgh, Pa., explains research in gaseous electronics by Westinghouse.

Right hand column are: the ten top winners photographed with Dr. Leonard Carmichael, secretary of the Smithsonian Institution and president of SCIENCE SERVICE; *Dr. Bayne-Jones, Dr. C. C. Furnas, Assistant Secretary of Defense for Research and Development, and Dr. I. I. Rabi, Nobelist physics professor at Columbia University, discuss their research with some of the winners; Dr. Alpert answers questions concerning his research on charged particles in gases, and winners see the cyclotron at Carnegie Institution's Department of Terrestrial Magnetism.* →

GENERAL SCIENCE

Earmark $9,500,000 For Science Teachers

➤ HIGH SCHOOL SCIENCE and mathematics teachers recently received a big helping hand from the House of Representatives. The House passed an appropriations bill for the National Science Foundation that clearly earmarks $9,500,000 for these teachers.

Aimed at alleviating the scientific manpower shortage in the nation, the money must be used by the Foundation, the country's official science arm, for tuitions, grants and allowances to be made to teachers for supplemental training.

It was included in the total appropriation to the Foundation of $35,915,000, a cut of $5,385,000 from the President's budget. The $35,915,000, nevertheless, more than doubled the funds appropriated for fiscal year 1956, $16,000,000.

During hearings on teacher-training work by the National Science Foundation, Albert Thomas (D.-Texas), chairman of the subcommittee, told Dr. Detlev Bronk, chairman of the Foundation's National Science Board, "you are going right at the fundamental thing, this shortage that is created by a lack of high school teachers. When you start doing work like that, you are really striking something that is of value to the whole nation."

Science News Letter, March 17, 1956

MEDICINE

Relaxing Drug for Stiff, Aching Muscles

➤ A NEW RELAXING DRUG, for muscles rather than minds and emotions, has shown promise of helping patients suffering a variety of ailments, reports in the *Journal of the American Medical Association* (March 3) show.

The drug is zoxalolamine, trade-named Flexin. Its chief effect seems to be in making patients more comfortable and more able to benefit from exercise and other forms of physical therapy.

It was especially effective in relieving stiffness and aching from rheumatic diseases, Drs. Richard T. Smith, Kenneth M. Kron, William P. Peak and Irvin F. Hermann of Philadelphia reported. They got excellent or good results in 85 of 100 patients. Some had complete relief within 30 minutes after swallowing the pill. Stiffness after a night in bed was relieved in half, and in some cases in a fourth, the usual time.

Patients with spastic muscles were relieved of discomfort and inconvenience, but did not have better voluntary control of their limbs and complained of greater weakness so they could not get around as well, Dr. William Amols of New York reported.

Encouraging results followed use of the drug in 15 of 28 cerebral palsied children, but the long range effectiveness is not yet clear, Drs. Edwin H. Abramson and Henry W. Baird III of Philadelphia reported.

Burning taste, loss of appetite, vomiting and too much relaxation were among unfavorable effects in some of the children.

The drug was tried in patients with spasticity and other forms of uncontrolled muscular activity from damage to the spinal cord and brain. Results were best when the cause of the muscle trouble was disease in the spinal cord, rather than in the brain, Drs. Manuel Rodriguez-Gomez, Antonio Valdes-Rodriguez and Arthur L. Drew of Ann Arbor, Mich., found.

Further study of this new drug will be needed, the doctors pointed out, to determine the extent of its usefulness.

Science News Letter, March 17, 1956

MEDICINE

List Three Top Drugs For Seasickness

➤ THE TOP THREE DRUGS for checking seasickness are, by trade name, Bonamine, Phenergan and Marezine, according to findings of an Army, Navy and Air Force motion sickness team reported in the *Journal of the American Medical Association* (March 3).

When given three times daily, these three topped a list of 26 drugs tested among almost 17,000 servicemen during routine transport crossings of the Atlantic between November and April.

Effective, but less so than the top three, are by trade name Dramamine, Parsidol, Benadryl and Trimeton.

Bonamine had the longest lasting action, making it the "drug of choice" for long sea voyages where it may be necessary to continue using anti-seasickness medicine for several days, the military medical men report. For shorter voyages and most air travel, Phenergan and Marezine should be equally as useful as Bonamine.

Fear, anxiety and other psychological factors play a minor role in causing seasickness, it appears from the fact that reserpine and chlorpromazine, famous for banishing anxiety, showed no value in stopping or preventing seasickness in the conditions of the study.

Science News Letter, March 17, 1956

PUBLIC SAFETY

Home Greater Hazard To Men Than Women

➤ HOME is a more dangerous place for men than for women, figures released by the Metropolitan Life Insurance Company in New York show.

At ages 15 through 64, the home accident death rate for men was from one and three-fourths to more than twice that for women, in the 1950-1954 experience of the company's industrial policyholders.

This was the case in spite of the fact that men generally are not around the house as much as women.

Science News Letter, March 17, 1956

IN SCIEN

ENTOMOLOGY

Insects Threaten Eastern Corn Crop

➤ EUROPEAN CORN BORER populations have increased in eastern United States since 1954, despite a lower nation-wide average, a survey by the Department of Agriculture showed.

The borer, one of the costliest insect threats to corn in this country, exists in sufficient numbers to damage seriously the 1956 corn crop if weather favors the insect.

Farmers in eastern and northwestern Illinois, southeastern Iowa, and the eastern shore of Maryland can expect the heaviest infestations. South Dakota, Nebraska, Minnesota, Missouri, Ohio, New Jersey and Delaware are also threatened.

The national average dropped from 190 insects per 100 corn plants in 1954 to 164 per 100 in 1955. But in the East the borer population nearly tripled, jumping from an average of 33 borers per 100 plants in 1954 to 90 in 1955.

Greatest increases occurred in Delaware, Maryland, New Jersey and Rhode Island, it is reported in *Agricultural Research* (March).

Science News Letter, March 17, 1956

METEOROLOGY

Meteorologist Foresees Drought Forecasting

➤ DROUGHT CONDITIONS will soon be predicted at least two months in advance, a Weather Bureau meteorologist foresees.

Jerome Namias, head of the Bureau's extended forecast section, Suitland, Md., says methods already developed show a "moderate degree of success" for 30 days in the future.

Since drought-producing mechanisms are closely tied to the general hemispheric circulation, he warns in *Monthly Weather Review* (Sept., 1955), correct predictions of that must come first.

Mr. Namias defines a drought as "an extended period characterized by lack of precipitation" affecting the economy. He studied typical weather maps, averaged over a month, for the Junes, Julys and Augusts of 1952 to 1954, and compared them with similar charts for the preceding three years.

He also studied the chart for October, 1952, which on a countrywide basis was the driest month ever observed in Weather Bureau history.

Mr. Namias found that lengthy dry or wet periods have characteristic patterns very different in appearance.

Science News Letter, March 17, 1956

CE FIELDS

MEDICINE

Thyroid Gland Activity Affects TB Resistance

➤ THE OLD IDEA that people with over-active thyroid glands seldom have tuberculosis gets support from findings by Drs. Max B. Lurie and George S. Ninos of the Henry Phipps Institute of the University of Pennsylvania.

Rabbits given a hormone to increase activity of their thyroids gained a marked degree of protection against tuberculosis germs. Tuberculosis spread rapidly, however, in rabbits given a drug to lower activity of their thyroids.

The thyroid-stimulating drug is triiodothyronine. The thyroid-slowing drug is propyl thiouracil.

The explanation, the scientists believe, is that active thyroids increase the activity of the phagocytes, scavenger cells of the body, in which the TB germs take up residence. This enhances destruction of the germs. Low thyroid activity may reduce the activity of the phagocytes and thus hinder destruction of the germs.

Cortisone, famous arthritis remedy that is bad medicine for TB patients, probably "exerts its baneful influence on tuberculosis in part by suppressing thyroid function."

The findings are reported in the *American Review of Tuberculosis and Pulmonary Diseases* (March), Journal of the American Trudeau Society, medical section of the National Tuberculosis Association.

Science News Letter, March 17, 1956

MEDICINE

"Frozen Twitch" Upsets Muscle Work Theory

➤ A "FROZEN TWITCH" is giving scientists new information about how muscles, including heart muscle, get energy for their work.

It seems already to have upset a previous widely held theory of muscle energy source.

The frozen twitch is the twitch of a turtle muscle. The technique for catching and freezing the muscle in the act of twitching was worked out by Dr. Wilfried F. H. M. Mommaerts of Western Reserve University, Cleveland, with support from the American Heart Association.

The previous theory about how muscles get energy runs like this:

Food is broken down by the body in various ways, all of which lead to synthesis of a special energy-containing compound. The energy compound is adenosine triphosphate, or ATP for short. From ATP comes energy for the body's muscle activity, heat and nerve transmission. This theory has been based on strong but indirect evidence. No one has yet proved that ATP is the immediate source of energy in a contracting muscle.

Dr. Mommaerts tested this in the following way:

He strung up two equal pieces of turtle muscle in a special apparatus. One piece of muscle was given an electric shock which made it twitch. At this moment, within three-thousandths of a second, both pieces of muscle were slammed into a thermos bottle of liquid propane at minus 190 degrees temperature.

One bit of muscle was thus frozen in the act of twitching. The other was frozen at rest. Each was crushed and the chemical content was compared.

If the ATP theory were correct, less of this compound should have been found in the muscle that had been caught in the twitch. More should have been in the resting muscle that had not needed to use any.

Actually, this did not occur. Dr. Mommaerts and other scientists now suspect that the old theory was wrong. Muscle apparently can do its work without using up ATP.

Dr. Mommaerts' experiments and their implications are reported in a communication from the American Heart Association.

Science News Letter, March 17, 1956

MEDICINE

Vitamin Finding Points to Anti-Cancer Drug Target

➤ A NEW POINT in the body's chemistry at which anti-cancer drugs could theoretically be aimed is seen in a vitamin finding by Dr. Albert G. Moat of Hahnemann Medical College, Philadelphia.

The finding is that biotin, a B vitamin, controls production of nucleic acids, chemicals in the nucleus of cells. Specifically, biotin is needed for production of purines, raw materials from which nucleic acids are made.

Dr. Moat's finding, announced by the American Cancer Society, was made with yeast cells and other simple forms of life. The American Cancer Society explained it as follows:

The most malignant cancers have a metabolism more like that of yeast than of normal animal and human cells in that their rates of metabolism and reproduction are much more rapid.

By excluding biotin from the environment of the cells, Dr. Moat found that the nucleic acid precursors piled up in great quantities and growth ceased. Biotin possibly is an essential part of the enzyme which converts the raw materials into nucleic acids needed in cell genes and energy-transmission systems.

"At this stage," the Society said, "one can only guess whether the blocking of biotin, by using a false biotin or by eliminating it from a system, would damage cancer more than normal tissues."

Science News Letter, March 17, 1956

AERONAUTICS

Automatic Air Traffic Control Is CAA Goal

➤ A FOUR-POINT PROGRAM aimed toward eventual automatic control of all air traffic is being launched by the Civil Aeronautics Administration, Administrator Charles J. Lowen revealed in Chicago.

Installation of a giant electronic computer at Indianapolis in September is the first step, Mr. Lowen told the Air Line Pilots Association's Fourth Annual Safety Forum.

He announced CAA plans to acquire a B-47 and later a civil jet transport to be used in simulated airline service to study air and ground handling problems of jets.

To give air traffic control needed authority, it will be elevated to the status of a separate office within CAA, Mr. Lowen said.

All airspace at high altitudes, he proposed, should be controlled by CAA. This would require installation of 69 long-range radars by 1961, as called for in President Eisenhower's budget message.

The United States, Mr. Lowen said, "can buy whatever degree of traffic control it is willing to pay for," and American public opinion is awakening to the urgency of the problem.

The computer relieves the human operator of the clerical detail involved in separating traffic in the air, doing this part of the operator's job far more quickly than he can.

Science News Letter, March 17, 1956

ENGINEERING

Growing Americans Change Car Designs

➤ TALLER AMERICANS may mean lower cars.

Increases in the average height of Americans in the past decade mean many drivers now need more head room, William M. Schmidt, director of styling of the Studebaker-Packard Corp., Detroit, told a Society of Automotive Engineers meeting.

Conventional 48- to 54-inch high automobiles cramp the big men of the modern generation, Mr. Schmidt said. Lowering the body of the car is one way of solving the problem, Mr. Schmidt suggested, but it would work only on very flat highways because ground clearance on rugged or hilly roads would be insufficient.

Another solution is to seat passengers lower in the body of the car, he said, but that method is limited by "the inflexible human anatomy."

Carl Reynolds, styling representative of Chrysler Corporation, reported that automobile designers are considering manufacturing cars that will fit the owner's exact requirements more closely. Under this plan, two different types of cars would be placed on the market, one for city driving and one for long trips.

Science News Letter, March 17, 1956

TECHNOLOGY

What's Ahead in Automation

Nationwide survey points up the future for automation in industry. American Society of Tool Engineers finds that 16% of present production methods are automatable.

By HOWARD SIMONS

► AUTOMATION, a word still missing in most dictionaries, has become, nevertheless, a factoryhold word almost overnight.

"What's ahead in automation?"

This question was put to industry by the American Society of Tool Engineers to find out just how much of an impact on manufacture will be made by this scientific and technological dimension that has been added to the American production line.

Generally, automation will not make over American factories immediately. Nor will it do so for a long time to come.

The Society states that "as far as industry can see today, automation eventually can be applied to about 16% of all manufacturing operations in the metal-working industries."

Even this small percentage will have an "enormous" effect on American industry. It will open up many potential markets for all kinds of equipment. A plant wanting to convert to automation for one of its operations will often find that it must replace not only equipment, but processes too.

Automation will influence also the future design of products. According to ASTE officials, "the survey shows that there will be a greater tendency toward standardization of components, even though there may be less standardization of assemblies."

Foresee Differing Exteriors

This will mean that products will become more and more like human beings in the sense that although they may all look different on the outside, they are all- pretty much alike on the inside.

Automation can also mean an end to the "big-plant" concept of production, the report states. It is best suited to the medium-sized plants for the simple reason that it is easier to automate the manufacture of an engine, a transmission or an axle, than it is to automate the production of an entire car.

These are some results of the survey that had American industry take a long look at itself and automation.

The Society's study was made on three broad levels: geographical regions, the metalworking industries and plant sizes.

Geographically, interest in automation stacks up this way:

Highest interest is registered in the Middle Atlantic, east North Central and southern states. Industry in these states estimates that between 15% and 20% of all its operations are potentially automatable.

Industry in New England, on the other hand, appears to be less interested in automation at the present time than in any other region. Its estimate of total potential is ten percent.

The west North Central states, unlike their neighboring states to the east, do not show as much interest in automation, indicating that from 10% to 15% of their production can be automated.

The West at the moment appears to be sitting on the fence in regard to automation.

By 1958, 20% to 25% of the pots and pans, toys, pipe fittings and sporting goods you will be buying will have come off automated production lines. This is because interest in automation appears to be highest to producers of "fabricated metal products."

Automobile makers, however, are "still way out in front" among those manufacturers buying automation equipment for their plants. Over one-quarter of this year's equipment orders and an estimated one-third of next year's will be for automated automobile machinery.

Only a little behind the auto makers are the airplane makers, who will be buying 20% of their equipment from the automation stocks.

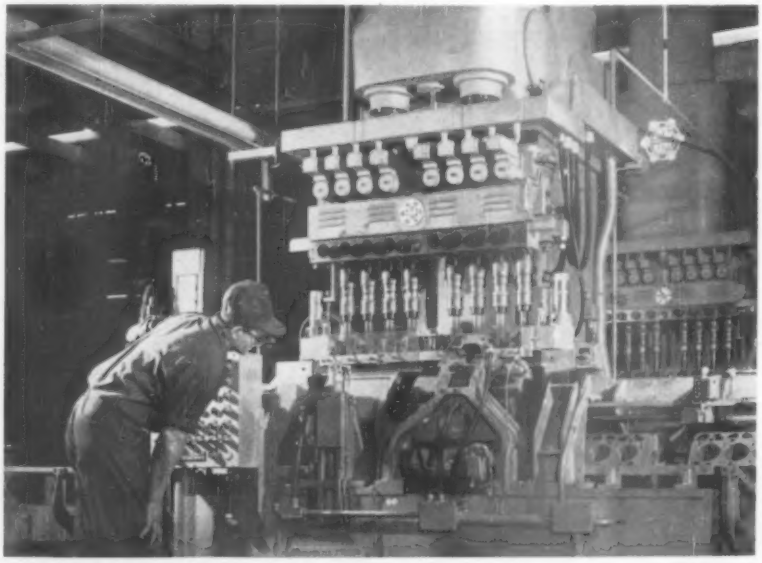
Oddly enough, the machinery makers who would conceivably make the machines that are automatable estimate that only about 15% of their industry can eventually be automated.

It is clear from the study that, although toasters, air conditioners, machines and trucks are all being considered as automatable equipment, it is not practical to automate the entire product.

Manufacturers seem to agree that specific operations of production, differing with each product, can be automated. But nowhere in the study is it indicated that a manufacturer contemplates making a whole product by automation.

The ASTE survey shows that only 16% of current manufacturing operations in the United States can be automated profitably.

To do this, however, industry would have to replace over 200,000 machine tools, 55,000 grinders and finishers, 50,000 metal forming machines and 25,000 production welders, in addition to other types of equipment for production.



AUTOMATED PRODUCTION—Giant boning machines on the automated assembly line of Ford Motor Company's engine plant at Cleveland, Ohio, put the finishing touches on cylinder bores in the Ford V-8 engine blocks. One-quarter of the new machines bought by the automobile makers this year will be automated equipment such as that shown here. Next year one-third of the total will be automatic.

Industry would also have to convert 125,000 machine tools, 25,000 grinders and finishers, 40,000 metal forming machines and 12,000 production welders now in use.

The biggest stumbling block to wide acceptance of automation appears to be lack of development of standardized units that would not have to be scrapped every time there is a model change.

Industry also seems to want "greater versatility in the control and operating equipment to handle wider ranges of sizes or more complex operations than is now possible."

Surprisingly, it was found, relative high cost of present automation equipment is not as frequently mentioned an objection as might have been expected.

Automation is best adapted to the medium-sized plants having from 250 to 1,000 employees. These medium-sized plants feel that 16% or more of their operations can be automated. Plants employing more than 1,000 persons estimate 20% of their operations can be automated.

Small plants with less than 250 employees face the biggest problem of automating their production. Automation is practical in many small plants in which production is relatively continuous on one or two products.

"As yet," the ASTE finds, "there is no major expectation that automation can be applied profitably to job-shops or job-lot runs." Although the Society surveyed metal working industries primarily, other industries are also sure that automation will work for them. A very large producer of plumbing supplies, for example, said that 70% of the foundry operations were automatable and a small producer of garden and lawn tractors said that from 50% to 60% of final cleaning and painting could be automated.

Automation, though a new word, is not a new idea.

The word "automation" was originated by D. S. Harder, executive vice-president of the Ford Motor Company, to describe a system for the automatic handling of parts between progressive production processes.

"Technological changes have been historically characteristic of all American industries, and account for a large part of the rise in the American standard of living," the Ford engineers explain.

"The petroleum and chemical industries, food and beverage processing industries and such non-manufacturing organizations as the telephone services have mechanized or automated their operations to an extremely high degree without particular notice being taken by the public of the advancing technology. And a flour milling operation which approached complete automaticity has been reported dating from 1784-1785."

Science News Letter, March 17, 1956

PHYSICS

Weaken Nuclear Glue

➤ ENORMOUS ENERGIES, far in excess even of the raging nuclear fires of hydrogen bombs, would be tapped if the nuclear glue of atomic hearts were weakened, an Atomic Energy Commission scientist has reported.

Dr. George G. Manov, AEC Commissioner Willard F. Libby's technical assistant, suggested studies with very powerful atom smashers now being built may yield clues to possible methods.

Discovering the composition of the mysterious force that keeps atomic hearts from flying apart, in spite of tightly packed positive charges that usually repel each other, is "the very frontier of science," Dr. Manov told students at Phillips Academy, Andover, Mass.

This atomic glue, he said, must possess some extremely interesting properties:

"Although it must have no net charge in itself, it is able in some manner to neutralize these tremendously powerful repulsive forces (of like charges) and to give considerable stability to the nucleus."

We may be on the verge of a totally new discovery, Dr. Manov said.

Scientists have long sought to learn what binds together the contents of atomic hearts. A bewildering number of particles, more than 20, can be driven out of the nucleus, yet no satisfactory theory to account for them is known. (See SNL, May 21, 1955, p. 330.)

However, mathematicians and scientists investigating energy levels within the atomic core, Dr. Manov said, have discovered certain regularities. They relate the atomic number of various chemical elements to the force that seems to glue together the electrical charges.

One nuclear particle, not yet isolated, for which an intensive search is being made is the elusive neutrino, the tiny neutral, massless particle needed to balance the energy equations of nuclear disintegrations.

Science News Letter, March 17, 1956

MEDICINE

Two Hormones Help Some Cancer Patients

➤ THYROID HORMONE and the adrenal gland hormone, cortisone, have been given to 40 patients with advanced breast cancer with good effect in about a third of the patients, the American Cancer Society announced. The treatment has been given over the past three years by Dr. Henry M. Lemon of Boston University.

A third of the patients were not helped and another third improved temporarily but for no longer than six months.

The results are considered as good as those obtained by removal of the adrenal glands or of the pituitary gland.

Science News Letter, March 17, 1956

ENTOMOLOGY

Funds Asked to Fight Tree-Killing Moth

➤ THE FEDERAL GOVERNMENT may decide to lend a hand in the fight against the voracious, tree-killing gypsy moth.

Congressmen from seven states threatened by the moth requested from the House appropriations subcommittee a total of $3,000,000 to fight the pest. The request is believed to mark the beginning of a more intensive Federal program for controlling the insect in infested areas.

Spearheaded by Rep. William B. Widnall (R., N.J.), representatives from Illinois, Kentucky, Minnesota, Mississippi, North Carolina and Washington asked for $1,500,000 for this spring and a similar amount for next spring to be used chiefly for spraying gypsy moths.

Spread of the gypsy moth has been blamed on hurricanes that have struck the eastern seaboard since 1938. Gypsy moth egg masses carried by bits of debris have been blown from their original New England habitat into northeastern Pennsylvania, northern New Jersey and most of Long Island.

The two-inch, red-tufted, bristled caterpillar is advancing westward and southward at an unprecedented rate. Midwestern states not yet affected are joining in the request for funds to enable the eastern areas to control the pest more effectively.

The money would be in addition to $545,000 already appropriated for gypsy moth control by the Federal Government and would supplement $1,500,000 now used for moth control by state governments.

It has been estimated that one additional acre of land can be sprayed for each Federal dollar appropriated.

Science News Letter, March 17, 1956

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Books of the Week

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BEHAVIORAL SCIENCE Vol. 1, No. 1—Franz Alexander and others, Eds.—*Mental Health Research Institute, University of Michigan (Williams & Wilkins)*, 81 p. illus., paper, $1.75 or $6.00 per year. Stressing an interdisciplinary approach to behavior problems.

THE BEST OF HEALTH TO YOU—*American Dietetic Association*, 8 p., illus., paper, 10 cents. How to eat for pleasure and health, and how to eat to lose weight.

BULLETIN OF THE ACADEMY OF SCIENCES OF THE USSR: Volume 18, Number 5—*Columbia Technical Translations*, 105 p., illus., paper, $20 or $110 per year. The first of a series of English translations. This issue is concerned with beta and gamma spectroscopy.

CARNEGIE INSTITUTION OF WASHINGTON YEAR BOOK No. 54—Vannevar Bush, president—*Carnegie Institution*, 311 p., illus., paper $1.00, cloth $1.50. Including reports of departmental activities and of cooperative studies.

CEREBRAL PALSY, ITS SCOPE AND MANAGEMENT—Marguerite Abbott—*Public Affairs Committee*, Public Affairs Pamphlet No. 158 A, 28 p., illus., paper, 25 cents. Information and advice for the parents of a cerebral palsied child.

THE CHEMISTRY AND REACTIVITY OF COLLAGEN—K. H. Gustavson—*Academic*, 342 p., illus., $8.00. Giving an outline of the chemistry of collagen in the light of modern concepts of proteins and protein reactions.

CHRISTOPHER'S TEXTBOOK OF SURGERY—Loyal Davis, Ed.—*Saunders*, 6th ed., 1484 p., illus., $15.50. Presenting different subjects covered by separate authors as originally planned by Dr. Frederick Christopher some 20 years ago.

CURRENT THERAPY 1956: Latest Approved Methods of Treatment for the Practicing Physician—Howard F. Conn, Ed.—*Saunders*, 8th ed., 632 p., $11.00. The practice of author rotation makes this a new book rather than just a revision of older editions.

DIAGNOSIS AND TREATMENT OF VASCULAR DISORDERS (ANGIOLOGY)—Saul S. Samuels, Ed.—*Williams and Wilkins*, 621 p., illus., $16.00. For doctors in this new specialty.

ECONOMIC POLICY FOR AMERICAN AGRICULTURE—Research and Policy Committee—*Committee for Economic Development*, 42 p., illus., paper. Single copies free upon request to publisher, 444 Madison Ave., New York 22, N. Y.

THE EFFECT OF MOTHERS' DIETS ON THE INTELLIGENCE OF OFFSPRING: A Study of the Influence of Vitamin Supplementation of the Diets of Pregnant and Lactating Women on the Intelligence of Their Children—Ruth F. Harrell, Ella Woodyard and Arthur I. Gates—*Teachers College, Columbia University*, 71 p., paper, $1.00. Chief finding is that, under some circumstances, diet supplements do increase intelligence of babies.

EFFECTIVE COMMUNICATION ON THE JOB: A Guide to Employee Communication for Supervisors and Executives—M. Joseph Dooher and Vivienne Marquis, Eds.—*American Management Association*, 294 p., illus., $5.50. Management tends to talk too much, and listen too little, declares one of the authors.

ENGINEERS' COUNCIL FOR PROFESSIONAL DEVELOPMENT, TWENTY-THIRD ANNUAL REPORT—L. F. Grant, president—*Engineers' Council*, 60 p., paper, $1.00.

ENGINEERS' JOB DIRECTORY: The Professional Guide to Engineering and Scientific Positions—Oliver P. Bardes—*Decision*, 1956 ed., 87 p., illus., paper, $3.25. The engineering graduate has no trouble in finding a job; the difficulty he faces is in making a choice among the many offers he receives. Here are facts to help him.

FACTS OF LIFE AND LOVE FOR TEEN-AGERS—Evelyn Millis Duvall—*Association Press*, new, rev. ed., 426 p., illus., $3.50. Originally based on 25,000 questions asked by teen-agers and now revised to reflect the present concerns of such young people.

THE FIRST BOOK OF GARDENING—Virginia Kirkus—*Franklin Watts*, 69 p., illus., $1.95. Telling the beginning gardener of whatever age how to plan and work a garden.

FOOD POISONING—G. M. Dack—*University of Chicago Press*, 3d ed., 251 p., $6.00. A reference book for physicians and health officers.

FORGET BIRTHDAYS—ENJOY GOOD EATING—*American Dietetic Association*, 6 p., illus., paper, 3 cents. What the older person should eat to prolong the prime of life.

FUNCTIONAL OTOLOGY: The Practice of Audiology—Morris F. Heller with Bernard M. Anderman and Ellis E. Singer—*Springer*, 225 p., $5.50. For physicians and others working in the field.

A HISTORY OF THE CROATIAN PEOPLE FROM THEIR ARRIVAL ON THE SHORES OF THE ADRIATIC TO THE PRESENT DAY WITH SOME ACCOUNT OF THE GOTHIC, ROMAN, GREEK, ILLYRIAN, AND PREHISTORIC PERIODS OF THE ANCIENT ILLYRICUM AND PANNONIA: Volume 1, Prehistory and Early Period Until 1397 A.D.—Francis R. Preveden—*Philosophical Library*, 134 p., illus., $7.50. Historical background for the understanding of these people.

HOW TO CHOOSE A CAMP FOR YOUR CHILD—Ernest Osborne—*Public Affairs Committee*, Public Affairs Pamphlet No. 231, 28 p., illus., paper, 25 cents. Help for parents in choosing a suitable camp.

HUNTINGTON'S CHOREA AND YOUR FAMILY—*Genetic Research Program*, 9 p., illus., paper, free upon request direct to publisher, Pouch A., Rochester, Minn. Helpful information for patients with this disease, sometimes called St. Vitus' dance, and for their families.

THE MEANING OF RELATIVITY: Including Relativistic Theory of the Non-Symmetric Field—Albert Einstein—*Princeton University Press*, 5th ed., 169 p., $3.75. This fifth edition contains the simplified relativistic field theory completely revised by Einstein and sent to the publisher just before his death. (See p. 163.)

NUMBER: THE LANGUAGE OF SCIENCE: A Critical Survey Written for the Cultured Non-Mathematician—Tobias Dantzig—*Doubleday*, 4th ed., 345 p., illus., paper, 95 cents. Reprint of a book, the first edition of which was published by Macmillan in 1930, dealing with the concepts of mathematics rather than operations.

ON THE TRACK OF PREHISTORIC MAN—Herbert Kuhn, translated from the German by Alan Houghton Brodrick—*Random House*, 211 p., illus., $3.95. Describing the important prehistoric sites in France and Spain, and what they reveal of the lives of early men.

PALEOCENE MAMMALIAN FAUNAS OF THE BISON BASIN IN SOUTH-CENTRAL WYOMING—C. Lewis Gazin—*Smithsonian*, Miscellaneous Collections, Volume 131, Number 6, 57 p., illus., paper, $1.00.

PET DALMATIAN—Evelyn S. Nelson—YOUR DALMATIAN'S HEALTH—George Cameron—*All-Pets Books*, 64 p., illus., paper, $1.00. About a lovable pet.

PET GERMAN SHORTHAIRED POINTER—Richard S. Johns—YOUR SHORTHAIR'S HEALTH—J. F. Jones—*All-Pets Books*, 64 p., illus., paper, $1.00. Authentic information for the pet owner.

PET MINIATURE SCHNAUZER—Marie Slattery—YOUR SCHNAUZER'S HEALTH—R. B. Rigler—*All-Pets Books*, 64 p., illus., paper, $1.00. A small dog, but not a toy.

PET PUG—Filomena Doherty—AILMENTS COMMON TO THE PUG—Daniel T. Woolfe—TRAINING—Roanne Sims—*All-Pets Books*, 64 p., illus., paper, $1.00. This little dog is remarkably free of "doggy" odors and does not drool as many short-faced dogs do.

PHYSICS OF FULLY IONIZED GASES—Lyman Spitzer, Jr.—*Interscience*, 105 p., illus., paper $1.75, cloth $3.50. Designed for those who have had an introductory course in theoretical physics but otherwise are unacquainted with the detailed kinetic theory of gases.

PLASTICS PROGRESS 1955: Papers and Discussions at the British Plastics Convention 1955—Philip Morgan, Ed.—*Iliffe (Philosophical Library)*, 432 p., illus., $17.50. The third volume of those that have appeared under this title in 1951, 1953 and now 1955.

THE PRESERVATION OF NATURAL HISTORY SPECIMENS: Volume One, Invertebrates—Reginald Wagstaffe and J. Havelock Fidler—*Philosophical Library*, 205 p., illus., $10.00. A manual for the aid of students and their teachers.

THE PRESIDENCY TODAY—Edward S. Corwin and Louis W. Koenig—*New York University Press*, 138 p., $3.00. An examination of what are the duties, responsibilities and prerogatives of the President and discussing what should be done in case he should be disabled while in office.

PROGRESS THROUGH RESEARCH: Armour Research Foundation Annual Report 1955—H. A. Leedy, director—*Armour Research Foundation*, 57 p., illus., paper, free upon request direct to publisher, 10 West 35th St., Chicago 16, Ill. Reporting a volume of research of more than $10,000,000.

THE ROBOT ERA—P. E. Cleator—*Crowell*, 172 p., illus., $3.75. In the days ahead, the author predicts, man will increasingly have to compete with mechanisms.

THE SECRET OF THE HITTITES: The Discovery of an Ancient Empire—C. W. Ceram, translated from the German by Richard and Clara Winston—*Knopf*, 291 p., illus., $5.00. Only in

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the past few years have archaeologists solved the riddles that gave them the key to knowledge of the Hittites and their empire.

SEE THROUGH THE FOREST—Millicent Selsam—*Harper*, 46 p., illus., $2.50. A book for children about the birds, animals and plants of the forest.

SIMULTANEOUS CONTACT-INSTRUMENT FLIGHT TRAINING—Alexander C. Williams, Jr., Robert C. Houston and Lowell E. Wilkerson—*University of Illinois Institute of Aviation*, University of Illinois Bulletin Volume 53, Number 42, 32 p., illus., paper, free upon request direct to publisher, Urbana, Ill. Reporting an investigation to determine the feasibility of incorporating both instrument and contact flight training in a private pilot syllabus.

THERMODYNAMICS AND STATISTICAL MECHANICS: Lectures on Theoretical Physics, Vol. V—Arnold Sommerfeld, Edited by F. Bopp and J. Meixner, Translated by J. Kestin—*Academic Press*, 401 p., illus., $7.00. The author died while working on this volume. It was then completed by the editors.

THE TRUE BOOK OF ANIMALS OF THE SEA AND SHORE—Illa Podendorf—*Childrens Press*, 47 p., illus., $2.00. A book for children.

THE TRUE BOOK OF TROPICAL FISHES—Ray Brockel—*Childrens Press*, 47 p., illus., $2.00. To teach children about fish pets and how to care for them.

U. S. INFORMATION AGENCY 5TH REPORT TO CONGRESS — Theodore C. Streibert, director — *Govt. Printing Office*, 38 p., illus., paper, 20 cents. Reporting an intensive world-wide effort to broaden understanding of the United States.

YOUR BLOOD PRESSURE: And How to Live With It—William A. Brams—*Lippincott*, 160 p., illus., $2.95. Written by a physician, this book is directed to the layman in order that he may learn the facts about blood pressure in its various phases.

YOUR MOST ENCHANTED LISTENER—Wendell Johnson—*Harper*, 215 p., $3.00. About saying what you mean, and hearing and understanding what you say.

Science News Letter, March 17, 1956

ANTHROPOLOGY

Missionary-Killing Indians

➤ THE INDIANS responsible for the recent killing of five missionaries in eastern Ecuador are members of a tribe usually friendly to strangers who have been properly introduced, according to Dr. Matthew W. Stirling, director of the Smithsonian Institution's Bureau of American Ethnology.

The Indians, inaccurately called the Aucas, are described as "happy in disposition" by Dr. Stirling.

"They laugh and talk a great deal, although they are somewhat shy in the presence of whites until they have become well acquainted," Dr. Stirling reported. He has made a first-hand study of the neighboring Jivaro Indians, who hunt and shrink heads.

The term Auca (pronounced Owkah), according to Dr. Stirling, is not the name of any particular tribe. Auca is a Quechua term used in the Andean highlands to refer to any pagan Indian groups as contrasted with those who have adopted Christianity as their religion.

The Indians who did the recent killing are members of the Zaparo tribe, which lives between the Curare and Napo rivers, Dr. Stirling said.

He is not sure why the Indians attacked the missionaries, but he noted that white man's interference has been "generally disastrous" to the Zaparo tribe.

Historically, when the white man came in contact with the Zaparos, Dr. Stirling said, he brought many things, some of which had unfortunate consequences for the Indians. Among these Dr. Stirling cited new diseases, clothes that have an unhealthy effect on Indians in a hot climate, and interference with the Zaparo's patterns of living.

"They resented interference with their own religion and the attempt to substitute for it ideologies completely foreign to their own background and completely incomprehensible to them," Dr. Stirling stated.

Bans forbidding polygamy were a particular burden, according to Dr. Stirling. Because of the high death rate among the men of this warring, hunting people, women were always a surplus.

"Inevitably, sooner or later, the Indians revolted against this restriction on their liberties," Dr. Sterling said.

In the more remote regions where there was virtually no white population, as among the Zaparos and Jivaros, these revolts were successful and the mortality rate among missionaries was high.

Any number of things could have brought on the recent attack, "but it would have been cause enough for the Zaparos if they realized that their visitors from the sky were missionaries," the ethnologist stated.

The Zaparo Indians, Dr. Stirling noted, are very much like the other primitive tribes of the eastern Andes. They have no political or tribal organization. Instead of living in a village, they live in a single community house. They seldom stay more than a few years in one locality. They have no chiefs or leaders.

Medicine men, believed by the natives to control supernatural forces, are the most influential persons in a given community.

Dr. Stirling does not think the missionaries' airplane scared the Indians. They are not afraid of the complicated modern inventions, he said, but rather of simpler things.

"The occasional killing of a few people is an oft-repeated pattern that has been going on for the past four centuries and which will probably continue as long as efforts are made to change their way of life," Dr. Stirling concluded.

Science News Letter, March 17, 1956

A scale has been especially designed and built for the sole purpose of weighing a *meteorite* believed to weigh between 36 and 37 tons.

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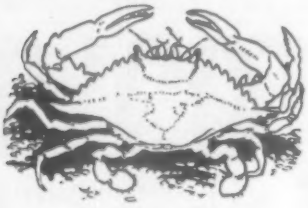
MARINE BIOLOGY

NATURE RAMBLINGS

by Hope Leffin



The Ornery Crab

➤ FOR BEING down-right ornery, it is hard to beat the edible crab.

With his body encased in a hard armor edged with spear-like projections and brandishing his two very effective pincers, the crab generates little affection from the beholder. Indeed, this seems to suit him fine; for he craves no companionship.

Place a half dozen big blue crabs in a pail and they attack each other with vigor, even breaking off each other's legs and claws.

For that matter, if you poke a stick, or a finger, at the crabs in that pail, it will receive a mighty bite from the claws, too.

The blue crab, *Callinectes sapidus,* common edible species of the East Coast, begins life as one of 1,500,000 to 2,000,000 eggs laid by the female, each egg being about one-hundredth of an inch in diameter. These eggs are carried about by the female in a mass called the "sponge," attached to her abdomen. They hatch in about 15 days.

The newly hatched crab is quite unlike its parents in appearance, and must pass through two separate stages before its mother might care to claim it. In the first stage, the young crab, called a zoea, is about 1/25 of an inch in length. After about six separate molts as a zoea, it becomes a megalops, in which it appears to be two large eyes being wiggled by a short tail.

It stays a megalops for only one molt, after which it is a full-blown miniature of its pugnacious parent, ready to give a junior-sized pinch to anything that comes near it. From here to maturity takes about 15 additional molts for the crab to attain full size.

Crabs grow in "spurts," increasing in size only when the old shell is cast off and before the new armor plate has hardened. It is in this molting condition that the crab is vulnerable, lacking both its hard covering and the power to bite. Then it forsakes the defiant position to lie buried, hidden—it hopes—in the mud.

Most blue crabs attain full growth and mate during their second summer, when from 12 to 14 months old. Three years is probably the top age for the species.

Science News Letter, March 17, 1956

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OPHTHALMOLOGY

Farsightedness of Old Age Complete at 52

➤ YOUR EYESIGHT gets old, so that you have a hard time focusing on close objects, sooner than scientists thought.

In fact, your ability to focus on close objects, which begins to decline in the middle forties, gets as bad as it will ever be at around 52. The age of 60 was believed to be the date at which the decline reached the terminal stage.

Studies of "presbyopia," or old sight, were reported by Drs. Elwin Marg, D. Hamasaki and Jin Ong of the University of California School of Optometry, Berkeley.

Science News Letter, March 17, 1956

METEOROLOGY

Reliable Weathercasts

➤ WHETHER PRETTY GIRLS or trained weathermen should present TV weathercasts, long the subject of private discussion among weathermen, now is being openly debated.

For the first time nationally, representatives of the Weather Bureau and the broadcasting industry met in Hartford, Conn., with TV weathercasters to discuss how weather news should be televised. The goal is more reliable and useful weather broadcasts and telecasts.

To reach it, many weathermen strongly urge a seal of approval be issued by the American Meteorological Society to weathercasters meeting certain standards.

Charming models who mix weather maps with the latest fashions but stick close to official Weather Bureau predictions may earn a better rating than self-styled "experts" who often get themselves out on a limb by making their own interpretations.

Many weathermen think only trained meteorologists should draw for TV viewers the daily maps and make explanations of tomorrow's weather.

Broadcasting authorities argue that the public wants to be entertained as well as informed, and that few professionally trained weathermen can do both.

That the public wants to know whether the next day will bring sunshine or rain and will be cold or warm, everyone agrees. But neither group really knows for sure what more the public likes and wants in the way of weather information.

That interest in daily weather news has increased because of television is also agreed. People are learning to see there are patterns in the high pressure and low pressure air masses that generally move from west to east across the United States.

A few programs already rate high alike with weathermen, public and broadcasters. With some exceptions, these are given by men with some meteorological training combined with several years of radio or TV experience.

When severe storms threaten, however, even the most competent non-professionals often turn directly to Weather Bureau forecasters for the weather picture.

Then the exact language used becomes considerably more important than in telling about rain or sunshine the following day. Lives as well as hundreds of thousands or millions of dollars are affected.

One difficult problem discussed at the Hartford meeting, organized by the American Meteorological Society and the National Association of Radio and Television Broadcasters, is that of sponsorship.

Because of their high popularity, weathercasts are considered choice programs by sponsors. Meteorologists and much of the public object to interruptions in a weathercast for a commercial. They dislike having the same person present both, even when weather information is given without interruption.

Many would like to see weather programs presented as a public service, but this would mean a loss of revenue to the TV station.

A final result of the Hartford conference is expected to be, within a year or two, the award of a seal of approval to reliably presented weather programs on TV and radio.

Science News Letter, March 17, 1956

PUBLIC HEALTH

Hall of Health Is Planned for Smithsonian

➤ THE SMITHSONIAN INSTITUTION in Washington is developing a Hall of Health, part of the museum's division of medicine and public health.

Exhibits in the new hall, to be opened in 1957, will cover man's knowledge of his body, both past and present. An advisory committee has been appointed.

Science News Letter, March 17, 1956

GENERAL SCIENCE

Change Security Rules

Scientists testifying before House subcommittee urge declassifying the project to control fusion reactions for peaceful purposes, and less secrecy for scientific findings.

➤ This country would make more rapid progress toward peaceful uses of the fusion of light elements, a controlled hydrogen bomb, if the project were not behind security bars, three scientists testifying before a House subcommittee agreed.

The solution to developing power from combining hydrogen, helium and other light elements into heavier elements is not expected in the near future, Dr. M. Stanley Livingston, physics professor at Massachusetts Institute of Technology, told the House Government Information Subcommittee.

He said the problem of taming H-bomb reactions is basic scientific research and should not be classified. Dr. L. V. Berkner, president of Associated Universities, Inc., and Dr. Elmer Hutchisson of Case Institute of Technology supported his statement.

The scientists also agreed that the basic strength of the United States is in freedom and progress, not restriction. Excessive military security, they said, hampers the free flow of information upon which progress rests.

Information flow, Dr. Livingston said, is restricted both "into and out of Government agencies." New ideas and new concepts are far more vital than secrets represented by weapons already developed.

Such new ideas come from the interplay and synthesis of many factors, and no one can tell beforehand what information is relevant, Dr. Berkner said.

Bell Telephone Laboratories, it was pointed out, accepted a calculated risk in releasing information about transistors so that many industrial firms could work on them. This move paid off in much more rapid development of the tiny devices that replace vacuum tubes for many applications.

When the results of scientific experiments are locked away and available only to a few others, much effort is wasted duplicating that work in laboratories staffed by scientists without access to classified information.

In time, however, Dr. Berkner pointed out, the work is inevitably duplicated.

Even when results of research "born" classified are removed from security restrictions, they are often out of date or not easily available to other scientists.

Publication in established scientific journals is the best method of informing scientists of new or recently declassified developments, Dr. Hutchisson said, and suggested the National Science Foundation might support such efforts.

The country should take a searching look at the results of its security regulations, Dr. Livingston urged. It would prove advisable in the long run, he suggested, to substitute security by achievement for security by restriction, which is the basis of present regulations.

To win men's minds, which Dr. Livingston said is the "real struggle" now going on in the world, he suggested it might pay to ask the peoples of the world for their help in solving the problems of controlling H-bomb reactions for peaceful purposes.

Science News Letter, March 17, 1956

PSYCHOLOGY

American POW's Taught To Lie by Communists

➤ AMERICAN PRISONERS of war were actually taught to lie by their Chinese captors.

The method used by Chinese Communists to extort false confessions of germ warfare from American POW's even when they did not resort to beating and other physical torture is explained by Dr. George Winokur, psychiatrist of Washington University, St. Louis, Mo.

The Communists took advantage of well known and internationally known laws of learning, Dr. Winokur found in interviews with returned POW's.

Although the men were not beaten, they were made extremely uncomfortable. The food was either unpalatable or inedible. The weather was cold and there was no heat. They were kept in darkness in vermin-infested quarters.

From this miserable state they were taken into a warm room, given a warm meal and tobacco, and were questioned. At first they were required to write silly and immaterial lies. A man would be required to write that his father was a factory worker when in reality he was a farmer. After the lies were written, the prisoner would be treated kindly for a period. Then the cycle was repeated.

In this way the prisoner found that the hostility of the enemy was reduced when he wrote down lies, however nonsensical.

Then gradually the enemy led up to the false confessions.

The prisoner learned to lie as a protection against intolerable stress. He also inwardly excused his lying by reasoning that it could not aid the enemy to tell the enemy lies of nonsense.

The POW's interviewed by Dr. Winokur had not broken under the strain of their experiences. They were sound mentally and emotionally.

Science News Letter, March 17, 1956

Questions

AERONAUTICS—To what use will the Civil Aeronautics Administration put its electronic computer? p. 169.

□ □ □

ENTOMOLOGY—What insect threatens corn crops in eastern United States? p. 168.

□ □ □

MEDICINE—What are the three top drugs for treating seasickness? p. 168.

How has a "frozen twitch" upset the theory of about how muscles get their energy? p. 169.

□ □ □

PHYSICS—Why is the neutrino the object of an intensive search? p. 171.

□ □ □

TECHNOLOGY—How does interest in automation compare geographically? p. 170.

□ □ □

PHOTOGRAPHS: Cover, pp. 165 and 167, Fremont Davis; p. 163, Sprague Electric Company; p. 170, Ford Motor Company; p. 176, Nadco Sporting Goods Company.

BOTANY

Study Plant Growth in Weather Chambers

➤ TOMATO PLANTS grow best at a night temperature of 64.6 degrees Fahrenheit, Dr. Frits W. Went, plant physiologist at the California Institute of Technology, speaking as a Sigma Xi national lecturer, told the U. S. Naval Postgraduate School Club, Monterey, Calif.

This fact about tomatoes and other important fundamentals about plant growth have been discovered by growing plants under many different artificial climates in indoor weather chambers, Dr. Went said.

In the Earhart Plant Research Laboratory at the Institute, he explained, there are 54 growing test chambers in which discoveries about plant growth have been made. Temperature, humidity, periods and intensities of light, rain, fog, and gas mixtures can be varied to test plant growth.

Growth of tomato plants was measured in these chambers.

Science News Letter, March 17, 1956

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CARD GAME enables the player to learn a language. Designed for those who can read English, the game can be played by either two or four persons. Each game, available in a Spanish or French version, contains 120 cards, each with a letter of the language together with everyday expressions in the language.

Science News Letter, March 17, 1956

SEWING BOXES, window-clear, have built-in thread cutters. Separate compartments keep pins, needles, tapes, thimbles and what-have-you in place. One size has 24 spool spindles, seven compartments and four thread cutters molded into the plastic sewing kit.

Science News Letter, March 17, 1956

WALL HOLDER for mops and brooms is molded of butyrate plastic. Its three separate rings, rubber reinforced, hold mops and broom handles in vertical position. When not in use the rings fold back. It is available in four colors.

Science News Letter, March 17, 1956

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Science News Letter, March 17, 1956

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Science News Letter, March 17, 1956

PETRI DISHES for the laboratory can be used once and then thrown away. Made of styrene plastic, the sterile dishes used to grow microorganisms are optically clear and scratch free. They have a heat distortion point of 90 degrees centigrade.

Science News Letter, March 17, 1956

PARTY-LINE SELECTOR is a small device that locks out would-be eavesdroppers and rings only the telephone called. The device monitors the ringing codes and when it receives the right one for the phone to which it is attached, it rings the bell.

Science News Letter, March 17, 1956

MINIATURE CAR MODELS are exact copies of their full-size counterparts on the road. Twenty-four models of these British-made car toys for children have been produced. Ten are mechanical. Almost break-proof, the model car toys are die-cast.

Science News Letter, March 17, 1956

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Approximately 100,000 specimens of *beetles*, representing species from Europe and other parts of the world, are being added to the Chicago National History Museum collections.

A new *dental X-ray* machine takes a single panoramic picture of the whole mouth in less than a minute.